

Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 1 of 30

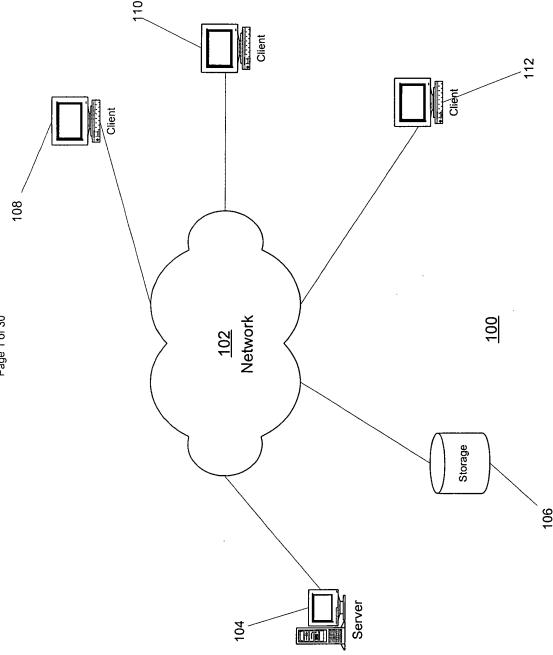
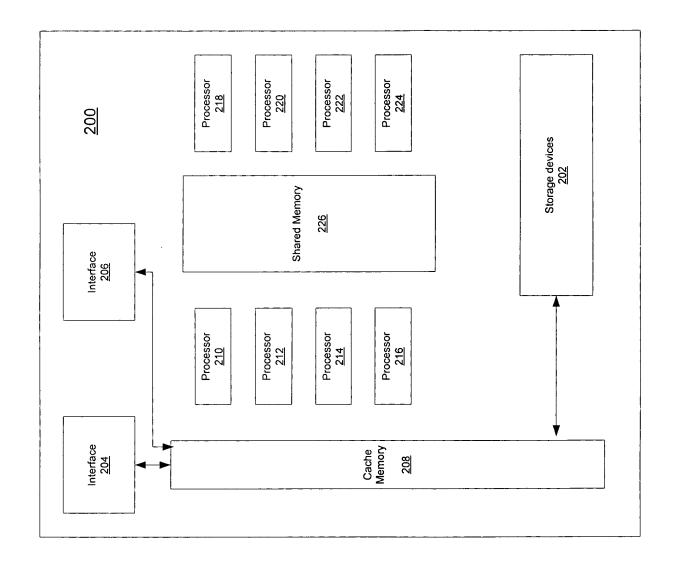


Figure 2
Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant Copy of Data
Page 2 of 30



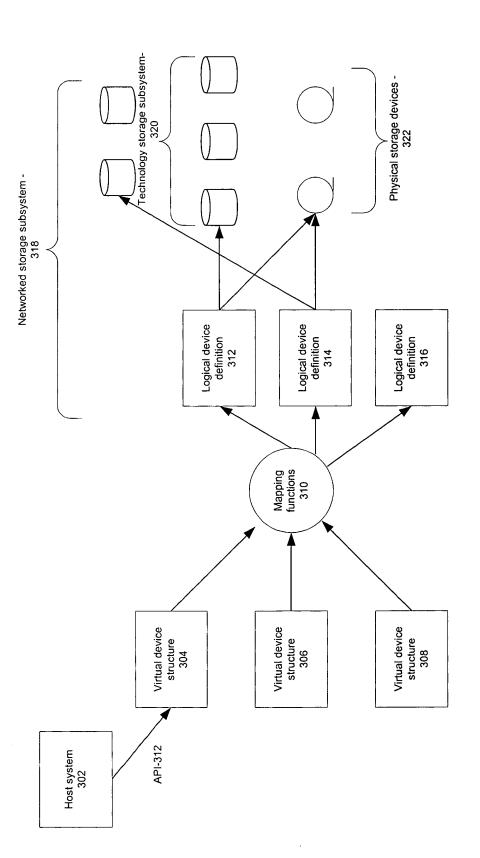


Figure 3
Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant Copy of Data
Page 3 of 30

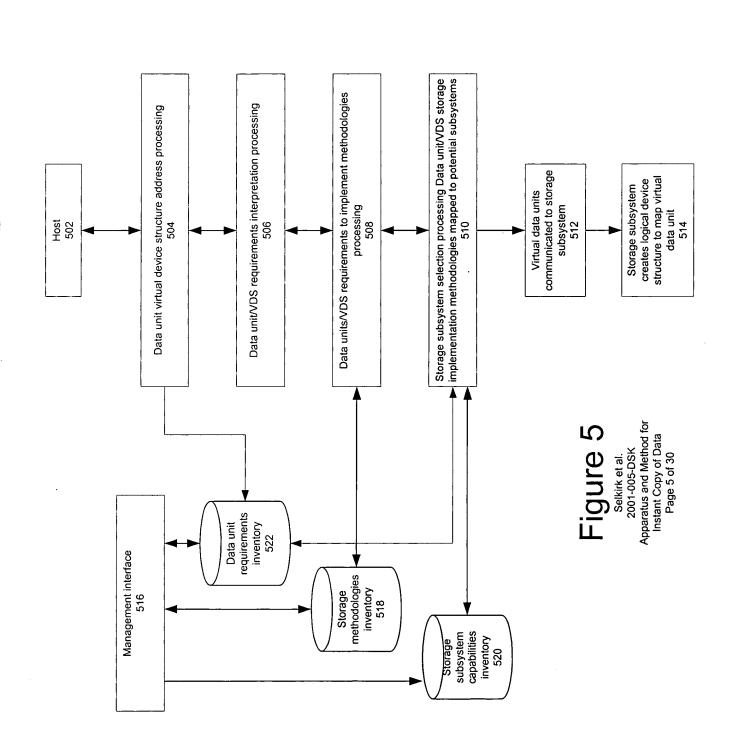
Data - records n<sub>k+1</sub> through n<sub>x</sub>; records ... Data - records nj through nk; records ny+1 through nz RAID stripe group B 404 RAID stripe group A

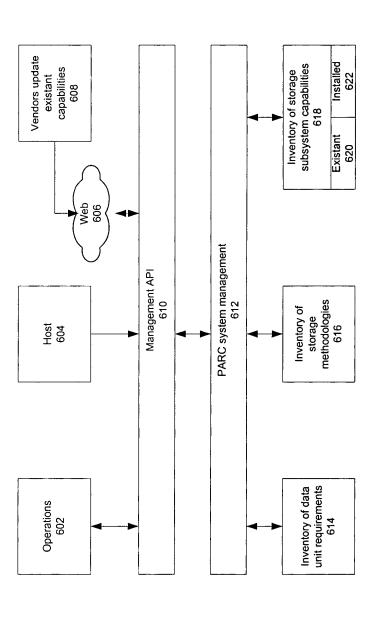
Figure 4

Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 4 of 30

RAID stripe group C

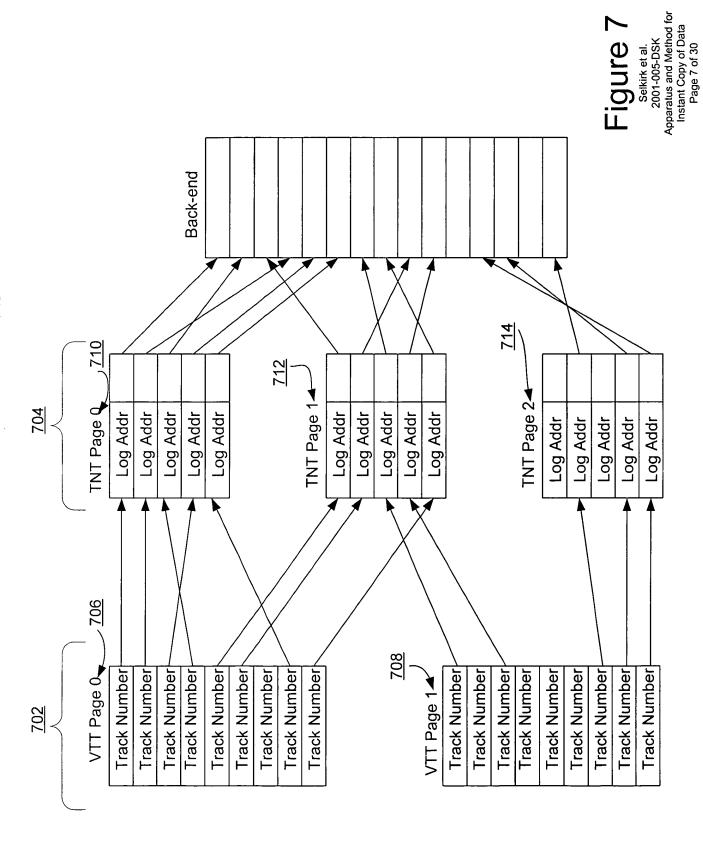
Data - records n<sub>x+1</sub> through n<sub>y</sub>; records ......





### Figure 6

Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 6 of 30



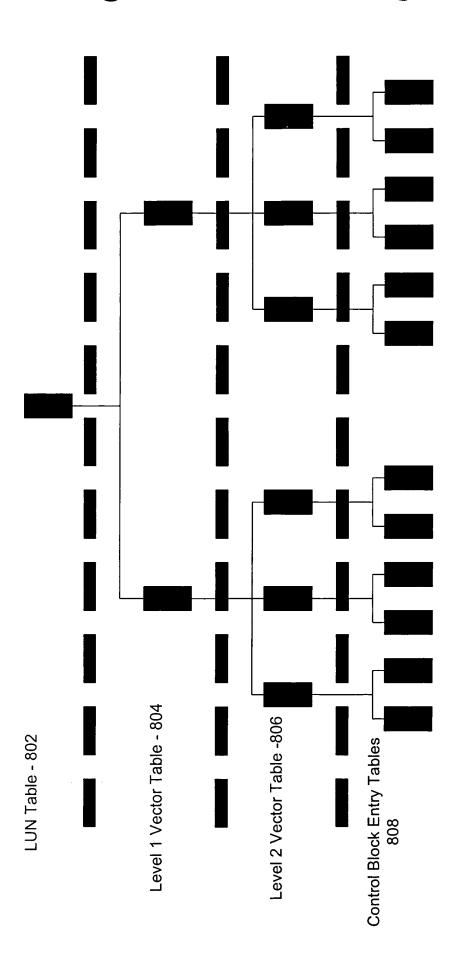
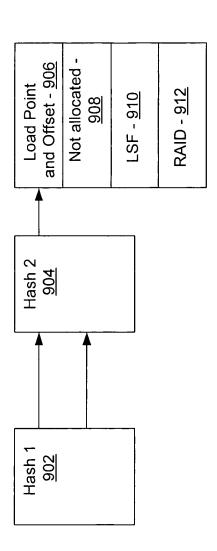
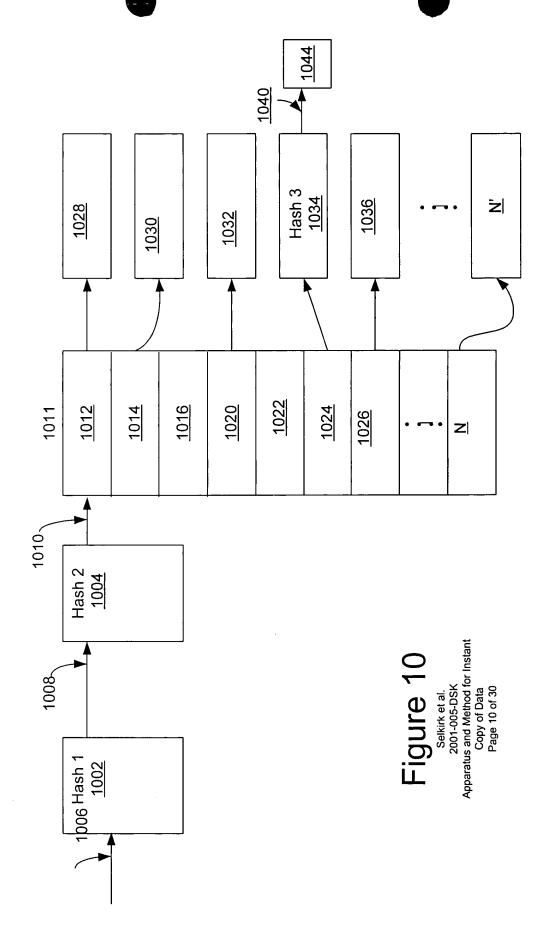


Figure 8
Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant Copy of Data
Page 8 of 30



### Figure 9

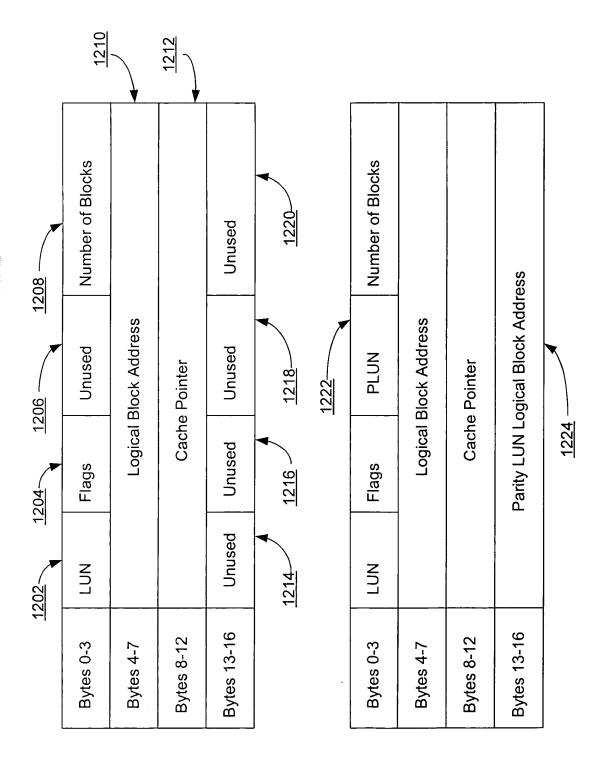
Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 9 of 30



Stripe 2 Parity -	1161	Stripe 3 - 1162	Stripe 4 - 1163	tripe 5M - 1164		• •	•	•	•	•					Drive - 1160
	1151	52	·			• •	•	•	•	•					Drive - 1150
Stripe 1 - 1141	Stripe 2 - 1142			1144		-	•	•	•	•	_				Drive - 1140
Stripe 1 - 1131	Stripe 2 - 1132	Stripe 3 Parity -	1133	Stripe 4 - 1134	•	•	•	•	•	•					Drive - 1130
Stripe 1 - 1121	Stripe 2 - 1122	Stripe 3 - 1123	Stripe 4 - 1124		•	•	•	•	•					 	Drive - 1120
Stripe 1 - 1111	Stripe 4 - 1112	1113	1114	•	•	•	•	•	•					 	Drive - 1110

Figure 11
Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant
Copy of Data
Page 11 of 30

FOR TOTAL TOTAL

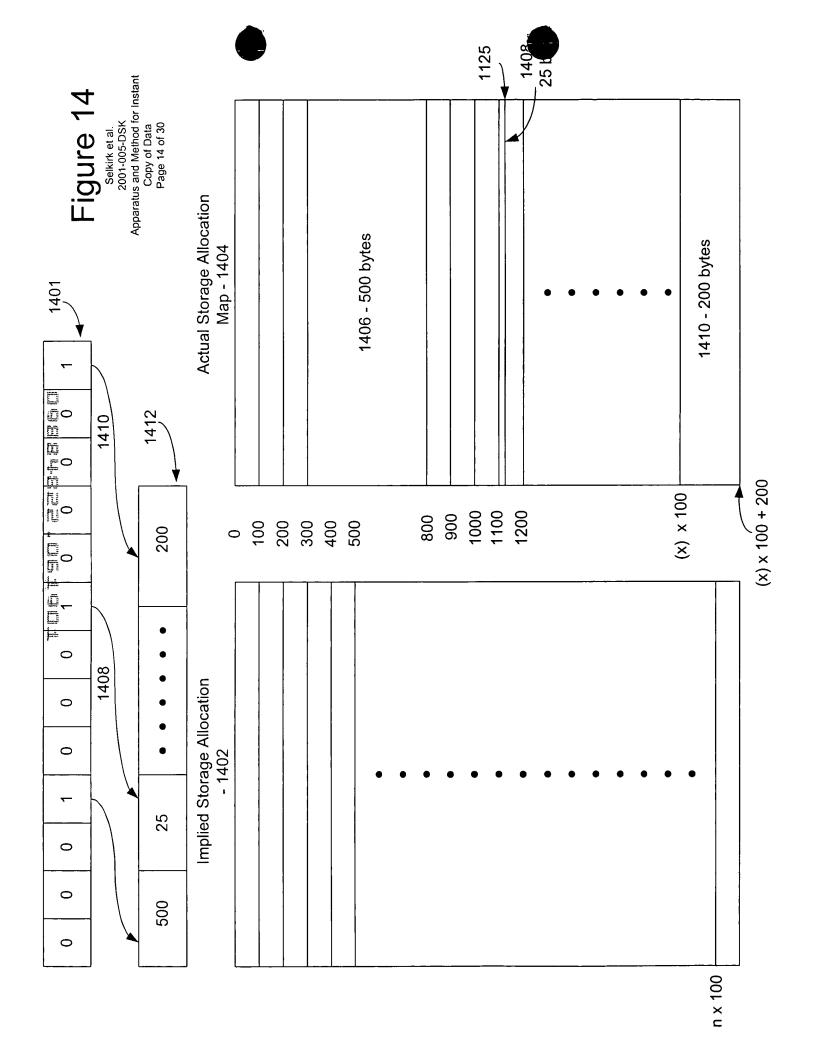


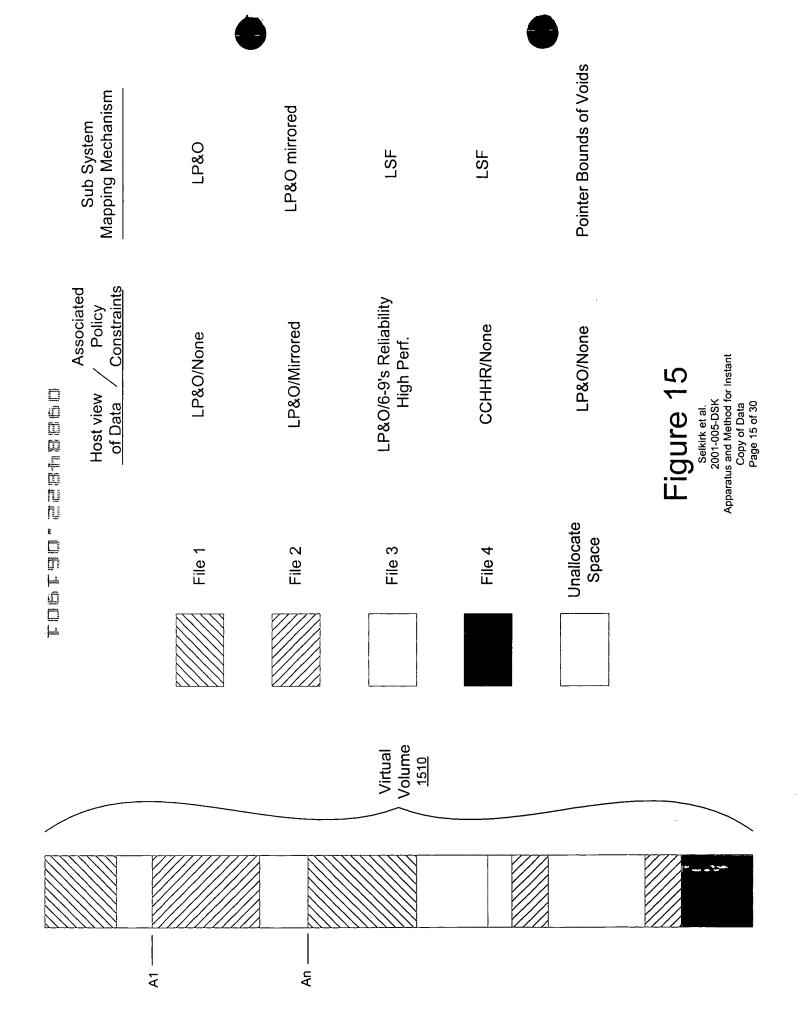
## Figure 12

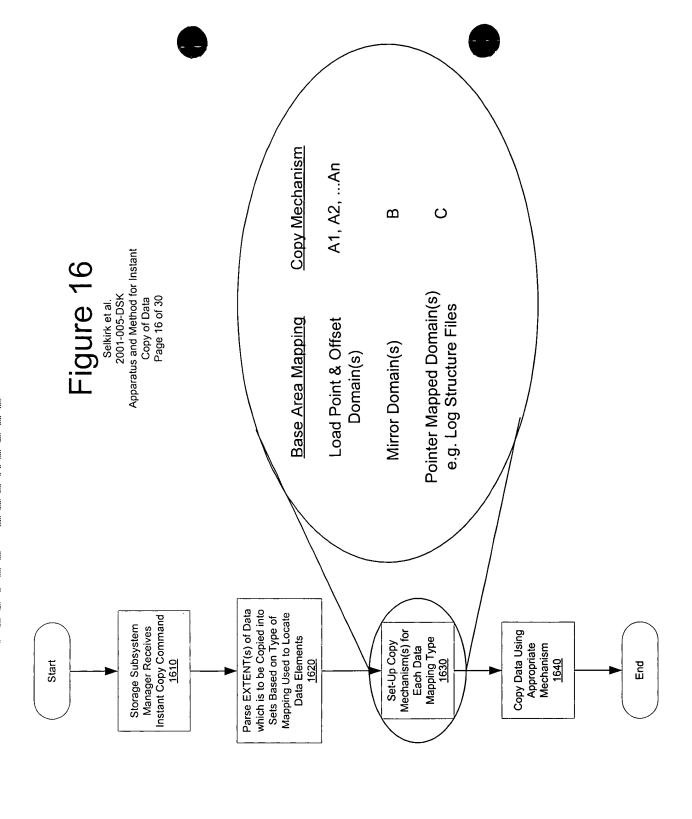
Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 12 of 30

	Times	Timestamp	
	LBA of prev	LBA of previous stripe	
Previous stripe LUN	Index of parity drive	Previous stripe LUN Index of parity drive RAID type of stripe # of strips in stripe	os in stripe
Strip size in blocks			
1st LUN in stripe	Active count	# of host pieces in strip	Unused
	LBA of data	LBA of data on 1st LUN	
2nd LUN in stripe	Active count	# of host pieces in strip	Unused
	LBA of data on 2nd LUN	on 2nd LUN	
Nth LUN in stripe	Active count	# of host pieces in strip	Unused
	LBA of data on Nth LUN	on Nth LUN	
Host LUN	Length in strip	Host Length	
	Hos	Host LBA	
Host LUN	Length in strip	Host Length	
	Hos	Host LBA	

Figure 13
Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant Copy of Data
Page 13 of 30







# 

## Original Mapping

# Instant Copy Meta-Data Type

**Full Pointer Table** Full Pointer Scheme

Load Point & Offset

Pointer for Changed Blocks Only
A1 - Old Data to New Memory Space
A2 - New Data to New Memory Space

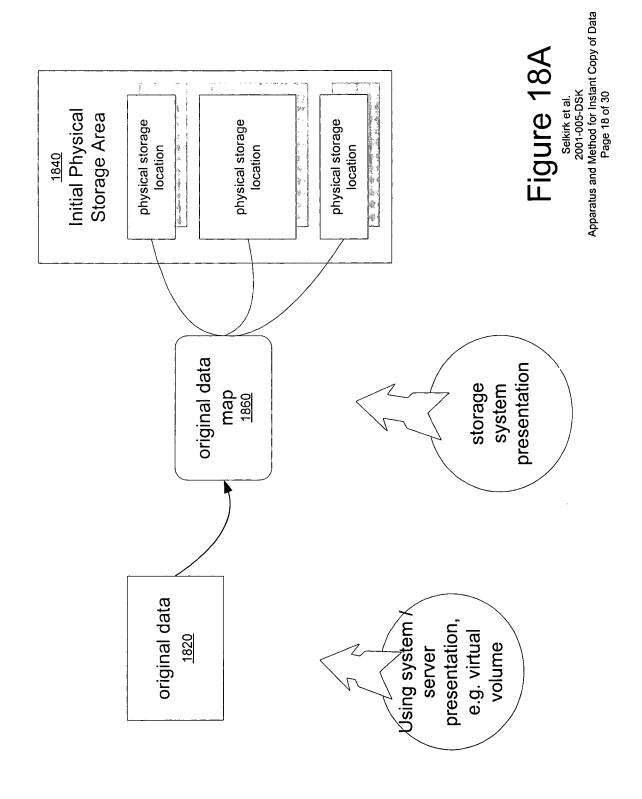
Full Bit Map for Copied Area Old Data to New Memory Space New Data to New Memory Space

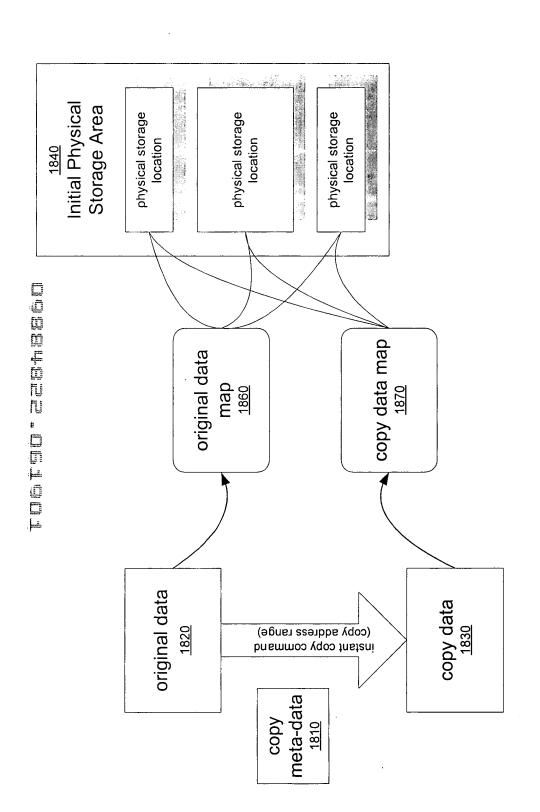
Multi-Level Bit Maps

Partial Area Bit Maps (with Extent Definitions & Pointers to Partial Areas)

## Figure 17

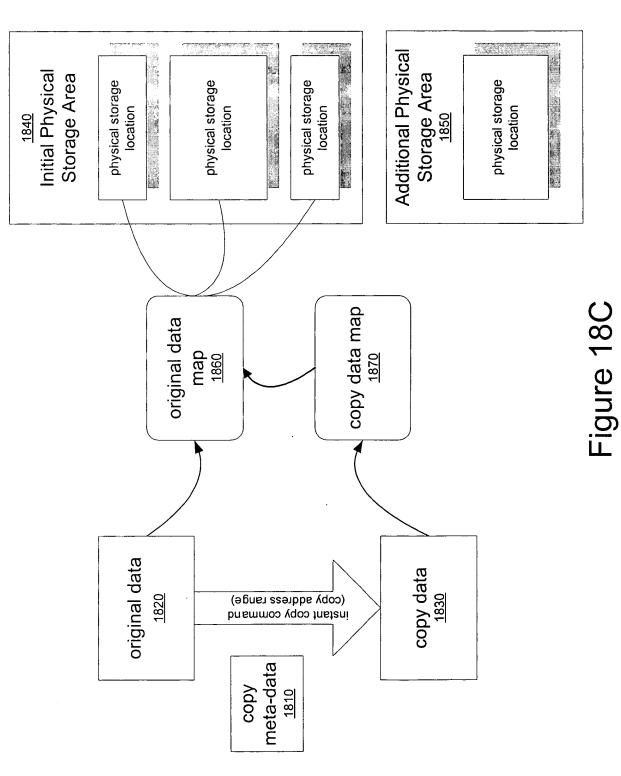
Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 17 of 30





# Figure 18B

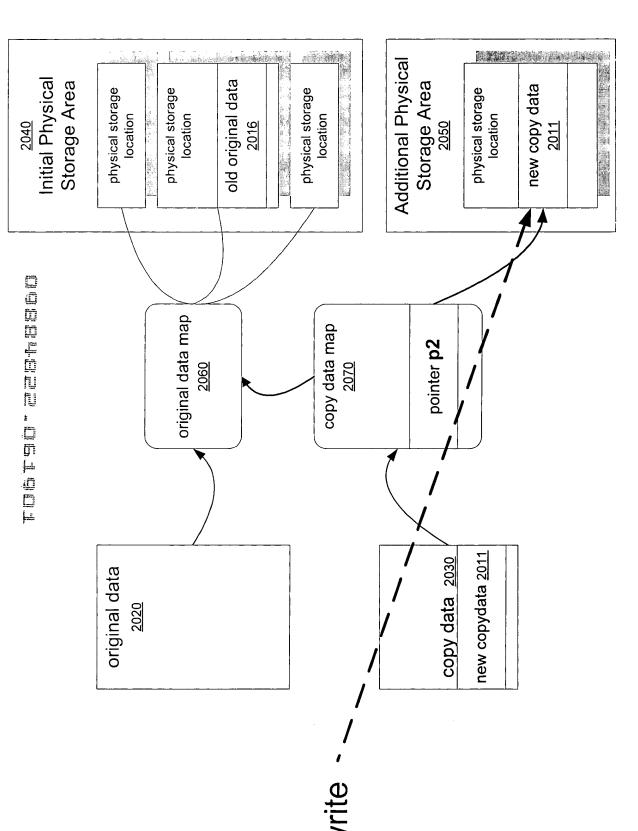
Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 19 of 30



Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant Copy of Data
Page 20 of 30

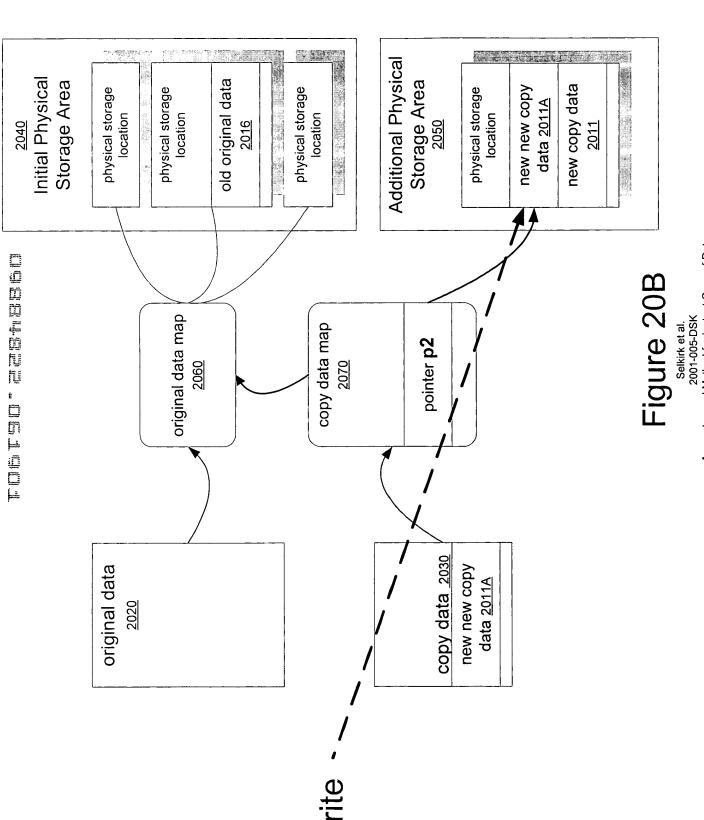
Figure 19

Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 21 of 30

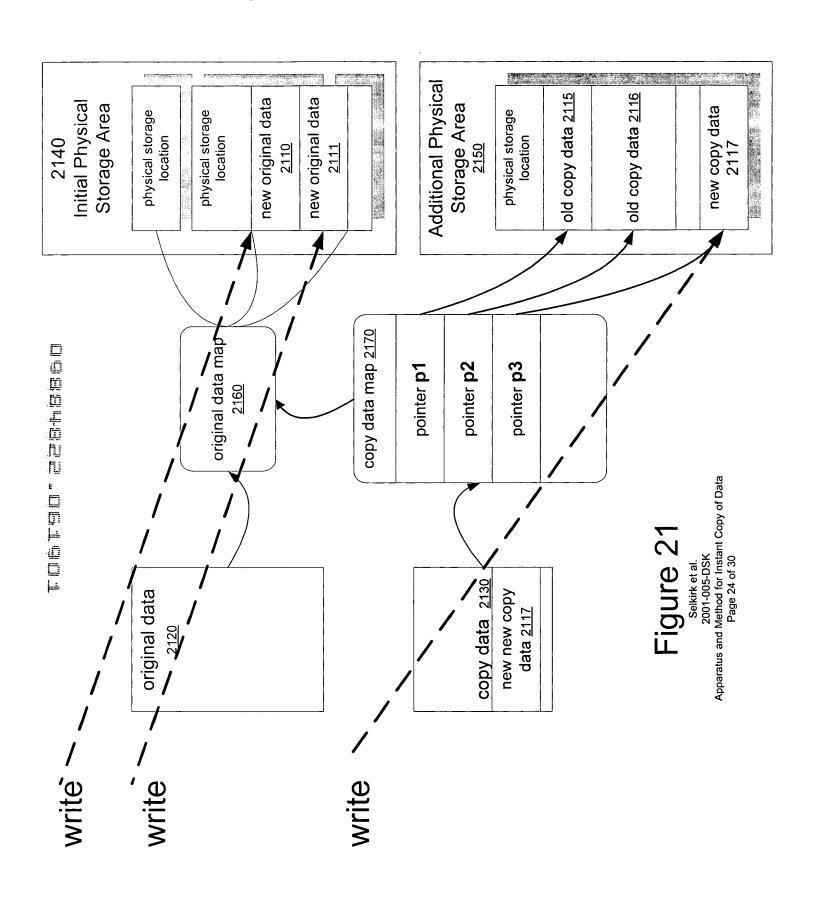


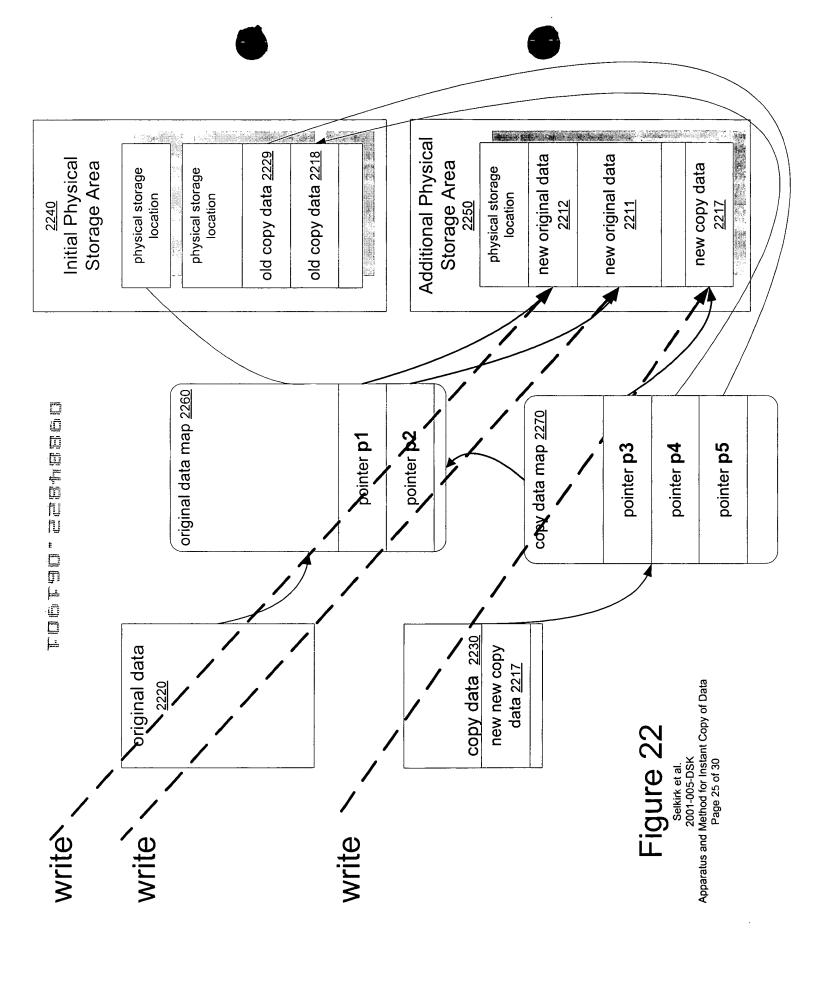
## Figure 20A

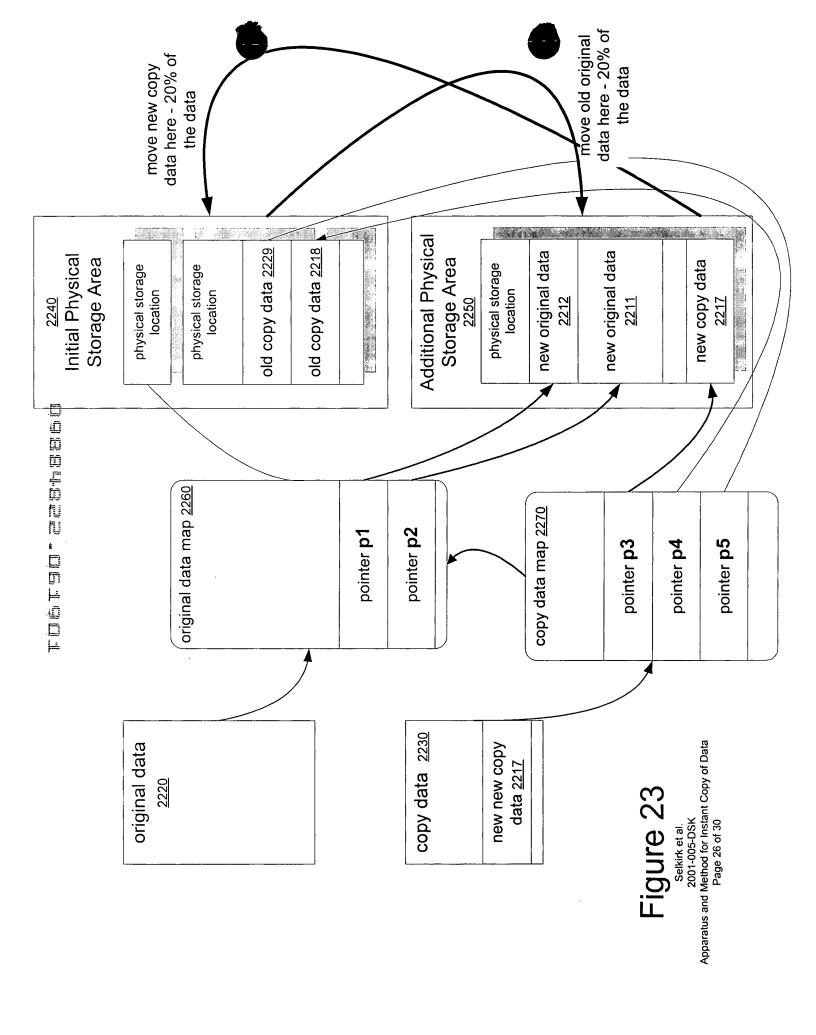
Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant Copy of Data
Page 22 of 30

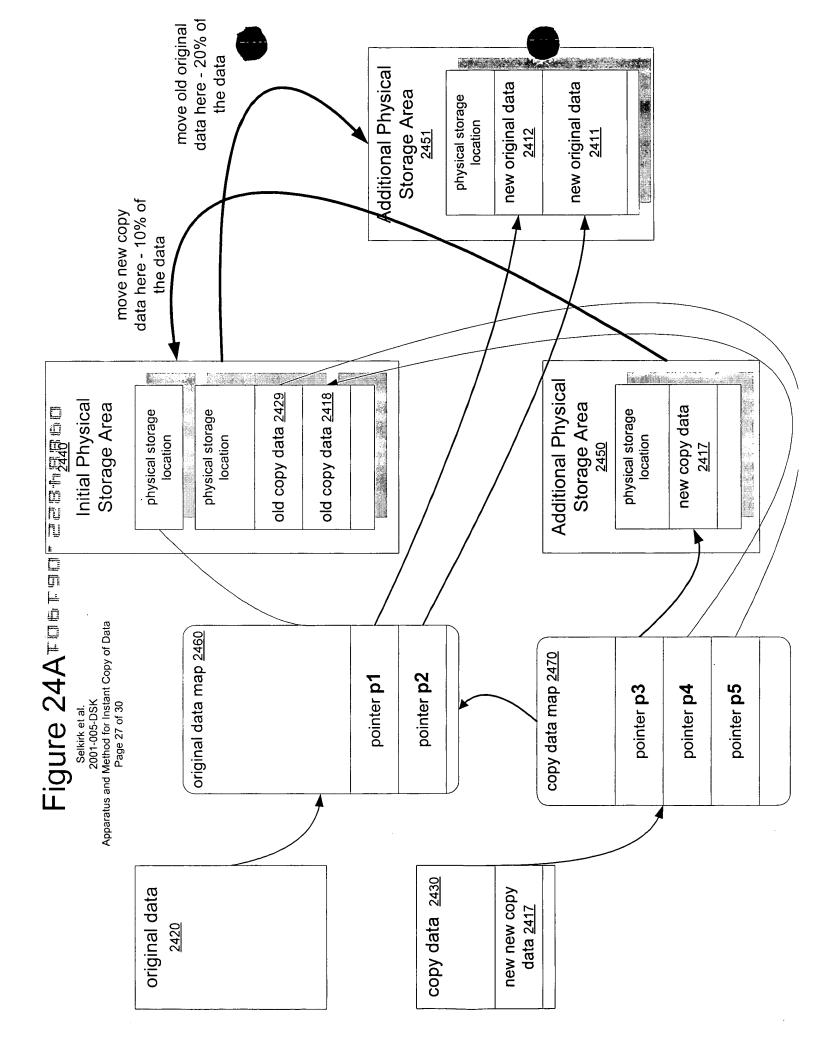


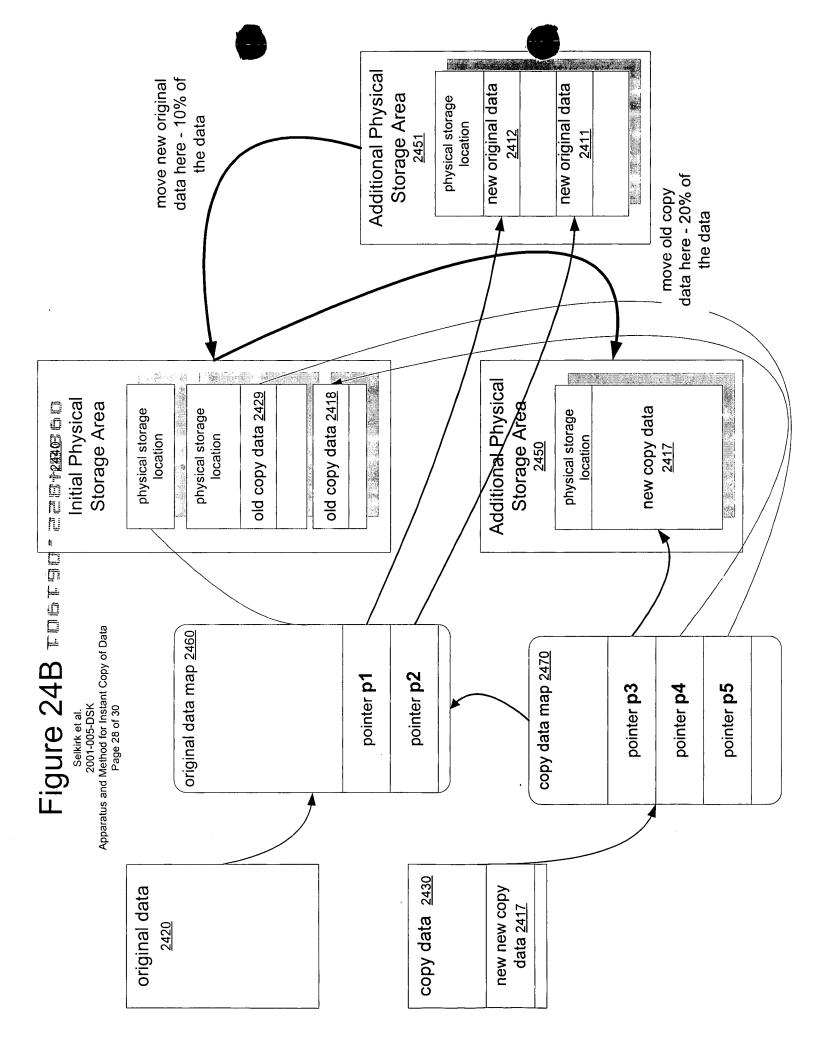
Selkirk et al. 2001-005-DSK Apparatus and Method for Instant Copy of Data Page 23 of 30

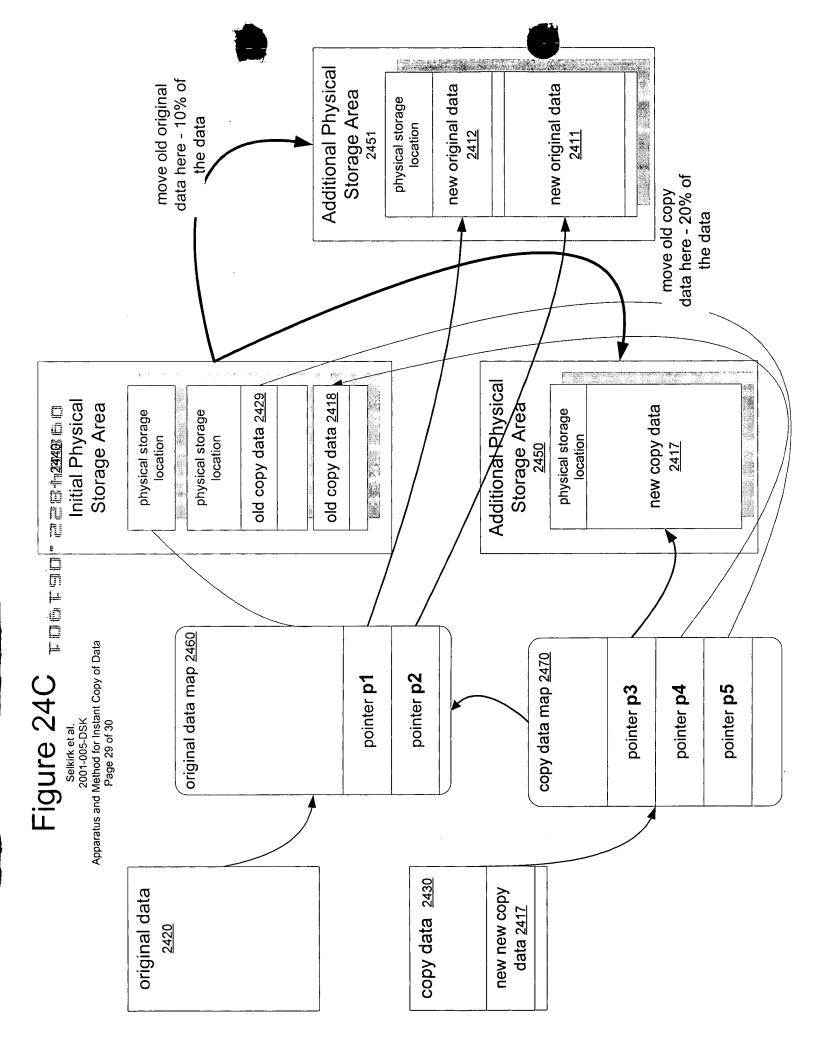


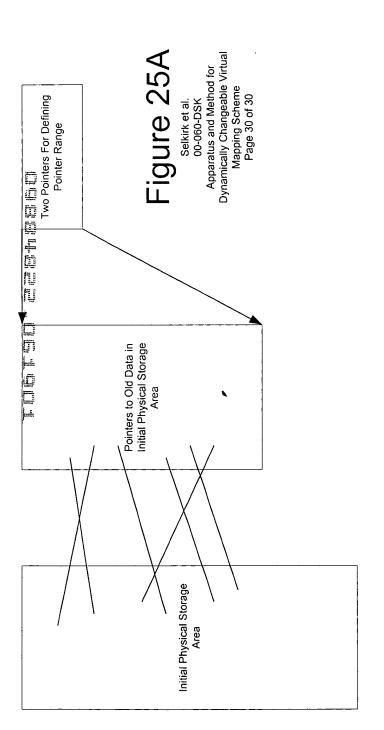












## Figure 25B

Copy Pointers Instant

Initial Physical Storage Area Pointers to

Selkirk et al.
2001-005-DSK
Apparatus and Method for Instant
Copy of Data
Page 30 of 30

